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SCIENTIFIC IDEALISM[1]

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IDEALISM is dead—at least many people think so. And no small number of those who think thus are persons of humane sentiments withal, and hold their belief under compulsion rather than willingly. They believe the evidence compels them to accept this view, whether it be agreeable to them or not. How else, they reason, can the course of events of these later decades be interpreted?

The history of man is the story of the terribly brutal reality of his existence on earth and his efforts to escape from this reality into some ideal realm wherein the peace and happiness and joy occasionally experienced in life shall be perfected and endure forever.

So powerful has been the allurement of this ideal realm that many of our race in ages past have devoted their best power, sometimes even their very lives to exploiting it and devising ways and means by which all may finally reach this promised land. These rare ones are acclaimed great among men and accepted as teachers and leaders just because they express the common longings of mankind, of the lowly as well as of the great.

In all the ages and culture stages of the past imaginarily perfect conditions of life have been among the most compelling motives with humanity. These imaginings have been near the heart of all the great religions and all the great philosophies of the world, their culmination as philosophy having been, probably, the several forms of idealism of the eighteenth and early nineteenth centuries. But what has come of it all?

If the realism of these questioners is of the dramatic sort, the answer they give to their own question is likely to be brief and laconic. A few dozen words and a gesture will tell the story: Germany and Austro-Hungary in August, 1914, and again in October, 1918! Russia in August, 1914, in April, 1917, in November, 1918, and today! Treaty making in Versailles in 1919! The human misery of all Europe during the war years and up to the present moment! The astounding transformations that have occurred in the hearts and lives of our own people since the new era opened! Finally, the uncertainty, the fore-

[1] President's address at the Berkeley Meeting of the Pacific Division, American Association for the Advancement of Science, August 4-7, 1921.

boding, the background of distrust, hatred, and fear with which all the peoples of the earth look toward the future!

Surely there is ground enough for the supposition that realism, a realism as stupid and brutal as Satan himself could rejoice in, has at last established its full claims—that idealism has departed from the earth wholly and for all time.

And what, they ask, has contributed more to these results than science? Have not scientific discovery and invention based on such discovery so involved man in a network of material forces and mechanical devices that he can hardly satisfy a single need, gratify a single desire, form a single idea, or think a single thought without the permission of this tyranny of material things?

For a modern seriously to attempt to live traditional idealism for one day could result only in death or something worse before the setting of the sun.

Nor is this the worst that science has done. In these grosser matters the injury to idealism has consisted only in thrusting the sensible realities of nature more numerously, more variedly and more insistently than ever before into the problem of living from hour to hour and day to day.

Of graver concern, science has, we are told to remember, entered the very domain of philosophy and besieged the citadel of idealism itself. Even the strongholds of morality and religion are not spared by the advance of realistic science. Copernican astronomy, Lavoisian chemistry, Lyellian geology and Darwinian biology have united in constructing so solid a foundation for a realistic philosophy of all life that the time-honored super-structure of idealistic philosophy is doomed to collapse and ruin.

The fact is thrown into our faces by the acceptors of the view that science is implacably hostile to idealism, that in these last years, not satisfied with its imminent victory over theoretic idealism, it has entered into full alliance with the ancient powers of darkness and malignity to accomplish the destruction of idealism itself and of all that idealism has created in the world.

High power explosives with guns and tanks and dreadnaughts and submarines and aircraft to make them effective went far toward realizing this ambition, but the finishing stroke is poison gases. The abundance of raw material for their manufacture, the ease of their transportation, the secrecy with which their nature and manufacture can be surrounded and, finally, the large co-efficient of deadliness of the best of them, make them very promising as means for completing the business of destroying all the works of civilized races, if not the races themselves. Of course no people, not even the scientists whose

devotion to research discovers the gases, intended to use these upon *themselves*. The enemy alone are to be destroyed. But since the enemy can, if also scientifically civilized, discover poison gases too, the result, whether consciously aimed at or not—the destruction of all idealism and its fruits—is certain.

But is this picture of the state of things really true? Is science indeed so destructive an enemy to idealism?

I deny it. Never, I affirm, has science been purposely hostile to idealism. Never has it designed to act against idealism. In so far as science has injured idealism it has done so undesignedly and unwittingly. Science has gone on its way, single-minded, bent only on ever increasing man's store of natural knowledge, on penetrating ever farther into the depths of natural truth.

But denial that the harm done by science to idealism has been intentional is of little consequence. What I chiefly care about is not the blamelessness of science for its injury to idealism. I would set forth the true relation of science to idealism and the moral obligation which this relation forces upon science. My aim is to acknowledge the terrible error committed by science in holding, even by implication, that it knows nothing about morals and has no moral obligations, and to show something of the nature of its obligation.

Speaking in broad terms, what I want to point out is that once science gives serious attention to the question of its own relation to idealism and realism it recognizes that the first question to be decided is not that of idealism vs. realism, not that of idealism or no idealism, nor of realism or no realism. Rather it is the question of what in essence idealism is, and what realism is.

To push this inquiry to exhaustiveness would need days. We seem stopped on the threshold by the demand for a treatise while all we can have is a tract. But it is not wholly so. From its very office as a ministrant to the common life of mankind, science can, if true to herself, concentrate her elaborate, forbidding treatises into simple, dramatic, appealing tracts at the urgent need of humanity.

It is in response to the danger call of civilization that I seek to reduce to the dimensions of a tract, the laborious findings of science on the real nature of the conflict between humanity's longings, beliefs, hopes and faiths and those forces—grim, powerful and ever alert—which oppose their attainment.

Notice, in the first place, the kinship of science with our ordinary intelligence. Nobody doubts that every item of our matter-of-fact knowledge about the universe in which we live is anything else than part and parcel of our general store of knowledge. Surely what the housewife knows about the things of her home; what

the workman knows about his tools and materials; what the merchant knows about his goods; what the engineer knows about the structure, the plans and the materials of which it is made; what the physician knows about our bodily members in health and disease, are but parts of common knowledge. But the articles that so much concern the housewife, the workman, the merchant, the engineer, the physician are the very same that concern the scientist. The only difference is that they concern the housewife, workman, engineer and physician more immediately, more vitally than they do the scientist. So the scientist, being perforce also domestic, workman, merchant and so on, is less apt to contend that his special knowledge is wholy different in kind from the knowledge of work-a-day men and women. None have cherished the characterization of science as organized common sense more than have scientists.

But again, has anybody ever doubted that mental structures in the form of memories, guesses, views and ideas enter essentially and largely into the intelligent pursuit of all callings? Planning the next meal, the next house-cleaning, the next jacket for baby; visualizing more effective wrenches and augurs and knives; imagining hats and shoes and gowns more appealing to customers, are part of the very life of the successful housekeeper, mechanic, merchant. Just so it is as to essential mental procedure with the scientific investigator. Apart from something mentally pictured but not yet realized—apart from some hypothesis—scientific discovery is unthinkable. Would any scientist claim that science is less dependent on ideas than is housekeeping, blacksmithing or merchandizing?

But having ideas is never the whole story in any department of rational human living. Everywhere and always the mental picture, the idea is something aimed at, something needed or desired for the fulfilment or completion or rounding out of some still larger, more inclusive need or desire. Whether the adage "Nothing existeth to itself alone" be strictly true or not, it certainly is true as to ideas. It is as much the nature of ideas to be in relation with one another and with other things as it is for them to exist at all. It is from this inter-relatedness, this mutual dependence of ideas and their relation to the individual's life as a whole that they get whatever drive and potency they have. But ideas plus the valuations placed upon them and the impulsions to act connected with them are exactly the things to which common experience has given the name ideals. Ideals are ideas in action or ready for action toward some supposedly good end.

From this it is seen that the scientist, especially the investigator, is of necessity an idealist by the same token by which the ordinary individual is an idealist. His idealism differs from that of other men only

as his technical knowledge differs from their common knowledge; namely, in that he uses his technical knowledge differently from the way practical men use their common knowledge. The outcome of this is the perception that science is not only idealistic but that its idealism marks the very summit of true, that is natural, idealism.

The idealism of Christian theology and last century's speculative philosophy are pseudo-idealism. They are disembodied idealism. They are mythical or dramaturgic idealism. If consequently, they have been stripped of some of their power it is only false power that has been taken from them and they have suffered only as thousands upon thousands of other products of man's imagination have suffered when it breaks away from its naturalistic setting and its control by the totality of human life.

If science is so beneficent in aim, how comes it that in spite of its gigantic prevalence in our day, that day fraught though it be with calamity and human misery perhaps as terrible as any of all the ages past, is yet heavy with borebodings of still greater calamity? Manifestly something has stood in the way, is standing in the way of man's becoming the beneficiary of this, surely one of the most notable and unique of all his creations.

Is it possible that man should bring into existence so mighty a thing, so potentially beneficent a thing as science and yet fail to reap its benefits; indeed, should allow it to become a powerful ally of forces working to his ruin?

Astounding though the truth may be, an open-minded reading of the story of man's career on earth reveals that he has *always been doing just that sort of thing!* Human history furnishes no guarantee that man will use any good thing, even of his own creating, to his own full and lasting benefit.

In all the stages of human culture from the lowest savagery to the highest civilization men demonstrate their ability to employ their highest spiritual powers as well as their lowest physical powers to their own harm, even to their destruction. Religion, art, learning, philanthropy no less than appetite, sex and material wealth—man has time and again made to contribute to his own undoing. This is a truth the perception of which is greatly important. But of still greater importance is the perception of another closely related truth, namely that with civilized man it lies ever within the range of his intelligence to choose that course of action which will make him a continuous beneficiary of anything his intelligence enables him to produce. In its very nature intelligence is able to prevent its own creations from being harmful. Of course man will never choose that which he is certain will do him more harm than good. It is only as to probabilities of harm and good, or greater and lesser good, or greater and lesser harm, that his choosing so often goes amiss.

To gain an understanding of these wonderful paradoxes of human nature would require a treatise. Sufficient to say that it is possible to go far toward such an understanding if we start with a mind wide open to the idea of man's kindred with the rest of living nature, particularly with the rest of animal nature, and go through to the end vigorously and unflinchingly. For myself, I am convinced that western civilization has come at last to a situation where nothing short of an unqualifiedly and carefully worked out *system of natural ethics will secure its continued progress; indeed, will save it from deterioration and final decay.*

Ours is a day for great and fateful decisions. Mighty goals of objective reality and mighty possibilities of action must be chosen among.

Neither optimism nor pessimism but that confidence which the wisely informed can alone possess is now, as never before, the way of salvation.

Let me outline what seems to me the most important part scientists must play in developing such an ethics as has just been mentioned and making the vital choices presented by the situation. The first thing for them to do is to accept unfalteringly and insist upon the necessity that all others shall accept, the *facts*, all of them, without addition or subtraction, which the system of nature, including human nature presents. The haggling that has gone on among the learned of the western world for two thousand years over the question of whether nature revealed through our senses is the ultimate reality or an illusion of one sort or another, must be and I believe is in a fair way to be brought to an end before long. Nevertheless it is astonishing, once one's attention is fixed on the point, how prevalent still even among men of science is the ancient state of uncertainty about the value of facts, and the still more ancient custom of furbishing them up in hundreds of ways to suit preadopted ideas and ideals. Many an excellent scientist still speaks of the laws of nature as though they were quite apart from and above the facts of nature. To such scientists laws are the essence of truth while facts are without much dignity, being mere objects of sense. Beyond a few such vital facts as the body's need for air, water and solid food, it seems that many scientists, in common with millions of the unscientific, still conceive themselves privileged to select such facts as interest them and to ignore all such as do not interest them. Uncritical a priorism still flourishes mightily in one form or another in the home of science. These marks of immaturity of science produce, under the stress of modern conditions, sundry untoward consequences. For one thing a new kind of criticism of science has been growing up in very recent years. The old conflict which theology forced upon science during the early centuries of the intellectual rejuvenation of Europe virtually ended about fifty years ago with science triumphant.

This new criticism which science is encountering is sociological and ethical rather than theological. The essense of the criticism is that science is not regardful of, indeed is largely inimical to, the spiritual welfare of man. This results, it is charged, from the avowed materialistic and mechanistic character of science. For one I frankly admit that there is much justice in this criticism, but I believe close scrutiny of the situation will discern that the real grounds of it are less in the fact that science is materialistic and mechanistic than that it *belittles what is greatest and best in human nature, especially in human personality.*

What is the defect within the body of science that makes it open to such criticism?

For several decades past there has been great controversy within the domain of the biological sciences over the relative merit of mechanism and vitalism. This controversy is largely academic, and consequently shows no signs of reaching a conclusion. The solution will come, I am quite sure, through the emergence of the problem from the realm of pure theory into that of practical life. The form which the inquiry assumes when it comes into the realm of human actuality is this: Accepting the patent fact that man is so wonderfully machine-like that he may be called a machine, at least provisionally, the question arises in what sense a machine? Would he be a machine in the sense of mathematical mechanics or in some other sense? The theory that he is a machine after the manner of mathematical mechanics disposes of itself quickly and completely the moment it submits to the test of practicability. Nothing is more distinctive of manufactured machines than that they can be standardized. All the individual machines of a particular kind can be so constructed that all the parts are interchangeable. Wheel for wheel, shaft for shaft, lever for lever, plate for plate, bolt for bolt—they are cast, often literally, in the same mold. To the last detail it matters not at all which piece goes into which machine. And note what is implied in the expression the "assembling" of manufactured machines—*pre*design and independent fabrication are implied.

These marks set off the manufactured machine so sharply from the human machine, if we decide it may so be called, that no one, not even the most dogmatic bio-mechanist, would deny the facts. Several other equally important differences could be pointed out, but may be omitted for brevity's sake. If men, actual men, are to be called machines, the term must have a sharply different meaning from what it has to the manufacturer. What shall this different meaning be? How shall it be arrived at?

Nothing stands out more unequivocally in the natural history of the human species, particularly of those portions of it that have made notable advances in culture, than that such advances have been due pri-

marily to a very few individuals who are called great because of their special capacities. The fact is never denied. All progress is initiated by the great warrior, the great political organizer, the great poet, the great philosopher, the great explorer, the great inventor, the great physician, the great teacher—one or a very few of each kind for each nation. Except for these rare ones there would be little or no cultural progress, little or no civilization. The fact, I say, is not in question. Even when due allowance is made for the pressure, external and internal, of general need, the importance and rôle of which I do not for a moment minimize, that pressure seems sure to come largely to naught unless the exceptional individual arises to lead and guide the latent forces. Only when it comes to interpreting the facts is there question. Of course one who is committed to the dogma that natural law in the sense of unvarying regularity, of perfect evenness of procedure, is the essence of natural truth, while facts are only sensory, is bound to find some way to avoid accepting these great *personalities* as truly significant so far as the general scheme of things is concerned. They must be reduced to "nothing buts" somehow, when a universal view is sought. They are to be regarded as accidents or by-products in the operation of central forces or of environmental pressure according to the last decade's biological orthodoxy. Or according to this decade's biological orthodoxy they are mere somatic variants, wholly independent of the germ plasm and consequently meaningless so far as the real part of organic matter is concerned. It is admitted that such exceptional personalities have cut some figure in the past career of man. For the future, with the improvement of the germ plasm under eugenic guidance, their role will become less and less until finally there will be reached the far-off state of absolute uniformity in an excellence which formerly would have been called divine.

The logically ideal human goal of the mechanistic philosophy is that all men shall be standardized after the manner of automobiles, on a model that is eugenically perfect. Man, germinally perfected, according to this philosophy would be standardized on the level, say of Packard limousines. Fords, Chevrolets, Essexes—small, cheap, and worst of all, different, would be eliminated.

Pray do not miss the main point here. You can hardly fail to see that it concerns the moral bearings of the mechanistic philosophy. But particular moral qualities and criteria of right and wrong are not my present subject. My point is rather to show that the dead-levelness of that philosophy has no room for such conception as right and wrong at all. The basal question is: Could there be such a thing as virtue if there were nothing but virtue, or if virtue were one only and that one wholly devoid of gradation? The mechanistic philosophy of life implies a solution of the problem of good and evil by eliminating difference.

This brings me to the place were I can indicate the direction in which the solution lies of biology's controversey over mechanism and vitalism. The cue is given by the demand of nature herself that personality shall be accepted and respected. Common sense surely finds no difficulty in heeding this demand, nor can it object to calling man a machine if some way of designating the machine shall be adopted which recognizes the obvious difference between the human and any inanimate machine whatsoever. And no designation, thus discriminative, could be more satisfactory than the simple word "living" prefixed to the word machine when the human or any other kind of animal is referred to. If the difference between a living man and the same man dead be accepted at face value, I am quite sure all sensible persons would willingly recognize men as machines—would even be willing to be called machines themselves.

The practical objection to the mechanical philosophy of life is that because it has no place in its scheme for the person it really has no place for life itself. A non-living thing is more real and hence more significant than a living one to this philosophy. A dead horse would be as valuable as a live one to the mechanistic philosopher who should stick to his philosophy in his practical life.

For brevity's sake I am going to assume that in any imaginable real world of real men, women and children, difference both in kind and degree is as indispensable to virtue as is food or anything else without which life could not exist. And here our reflections reach far beyond the mechanical philosophy, for we cut square across the main axis of ethical theory that has dominated European thought for many centuries, that theory hinging on belief in the ultimate good, necessarily one and alone because without a rival, as the proper goal of human striving.

There is now general agreement, I believe, among those who work practically as contrasted with those who discourse abstractedly on moral problems, that one cannot rightly assess or wisely promote a particular good until he knows what evil lurks within or behind it. Nor can he effectively combat a particular evil until he knows what good is mingled with it. These things I assume without argument, for I must leave a little time in which to show how diversity of talent and virtue, even to the greatest genius, though irreconcilable with a rigorously mechanistic philosophy of human life, is perfectly reconcilable with a naturalistic philosophy conceived in accordance with the best traditions of the natural history sciences.

Let me be very objective. Systematic botany and zoology have long been the type of natural history or the natural sciences. In common practice they have been placed over against the physical sciences on the one hand and the humanistic sciences on the other. Fixing attention more on subject matter than on knowledge corresponding to it, we see at once that nothing sets the plant and animal worlds off from the

inanimate world more obtrusively than the enormous number and diversity of kinds in the former as contrasted with those in the latter. Then comparing the plant and animal world with the human world we see that nothing stands out more sharply than the diversity of individuals in the human world as contrasted with that in the plant and animal worlds. The point is brought home with great force by noticing that each individual in the human world has a name all to itself whereas very little of this occurs in either of the other worlds. But the exceptions are highly significant. A few of the higher animals, notably those most closely associated with man, do have names. Speaking broadly, the human world presents itself to our understanding as composed of *individuals* and the plant and animal worlds as composed of *species*, while the inanimate world, sharply contrasted with both, stands in our knowledge as composed of a comparatively few kinds of *mass* and *energy*. The continents of the earth appear as land masses and the seas as bodies of water. Cloud masses bring rain, and coal and oil deposits and mountain streams furnish power. The point to be kept in the foreground is the indubitable fact that all solid advance in science has done as much to validate *diversity* in nature as it has to validate *uniformity*. It may be said with strict truthfulness, I think, that science rests just as much on laws of diversity as it does on laws of uniformity. There is no justification, psychological, logical or of any other sort for the common assumption that the essence of scientific knowledge is uniformity alone. Surely we cannot affirm that there could be scientific or any other knowledge without uniformity in nature. But equally surely, we cannot affirm that there could be scientific or any other knowledge without diversity in nature.

Of the many chapters in the history of science that could be drawn upon for proof of the conclusions just stated time will permit the notice of but one. But that one is epochal and crucial.

I refer to the fact that variety—difference—in living nature had to be *taken*, as though a thing of free grace, by Darwin for the very foundation of his theory of descent. And I call attention to this vital truth: Darwin and all the ablest naturalists since his time have devoted some of their best powers of observation and of thought to the problem of organic variety and variation, the one unqualifiedly positive result of which has been to widen and deepen the recognized fact of such diversity. Almost endless has been the controversy over the *casual explanation* of variation; but over the *fact of it*, no controversy at all. So it happens that when the naturalist passes from the world of plants and of animals to that of man, preserving the mental attitude and using the general method which his whole career has made second nature to him, he finds the individuality and personality so distinctive of the new realm readily conformable to his disciplinary predilection, his mental and manual technique, and his conceptual scheme.

One fact, however, though by no means new to him, stands out with such boldness in the new realm as to make him ply his methods of treating diversity with more assiduity and thoughtfulness than ever before. That fact is this very one of personality. The material with which he deals in the human realm compels him to notice attentively that the separateness and independence of human beings are not only quantitative and numerical but are qualitative as well. They are not only isolated and thus individual but they are differently individual. Every human being is not merely an *other*, relative to all the rest, but it is a *different* other.

I call special attention to the fact that *otherness* and *qualitatively different otherness* are very distinct conceptions, and I insist on the importance of the distinction, so vitally does it concern practical human affairs. Recognition of this distinction would be promoted by adopting distinctive terms for the two. There should be a general term for mere numerical otherness and another term for qualitatively different otherness. In my own usage I have come to make the two terms *individuality* and *personality* serve these ends. Latterly for me an individual man, woman, child, is only an *other* man, woman, child; while a personal man, woman, or child is not only an *other* but a different other. The full significance of thus distinguishing individuality from personality is seen only when we consider it as pertaining to the social and ethical realms.

In order rightly to exhibit it in these realms it is necessary to refer to still another aspect of the evolution theory, that is the adaptive character of living things. That man is dependent upon adaptation to his environment, as are all other organisms, is now so much a truism that the general fact only needs referring to as a preliminary to mentioning an aspect of the broad problem which has not yet got a sufficiently secure and influential place either in common knowledge or science. That men, like all other organisms must be adapted to their surroundings is so obvious that no one questions it. But recognizing that adaptation is essential in *certain aspects* of life and in the relation of life to certain aspects of environment, is quite a different thing from recognizing that *every aspect* of life whatever, is adaptive to environment, environment being considered broadly enough.

Beginning in modern times with the astronomy of Copernicus and Galileo the whole march of physical science onward to this very day with its discoveries like those of the Curies and Michelson, have been toward a commanding outlook from which may be seen the unity of all inanimate nature. Similarly the march of biological science has been toward a commanding outlook from which the unity of living nature is in clear sight. All this has brought it to pass that an adequate interpretation of man's relation to nature cannot be reached by

taking man and environment each piece-meal, with many of the pieces quite ignored even at that.

Nothing less than human nature in its entirety will suffice for the basis of modern interpretation of man's relation to nature. Consequently when that relation is expressed in the terms of adaptation and environment each must be generalized. Every aspect of human life, spiritual as well as physical, must be recognized as adaptively related to some of the aspects of the system of nature as a whole in its role as environment of human life. Not positive kowledge alone, but art, fine as well as industrial, philosophy, and religion, are manifestations of man's effort to solve the problem of his existence upon earth. They are all partly means and partly ends in the struggle for existence, this familiar and much abused phrase being rightly understood.

And now for the main point in connection with the idea of adaptation. I have just referred to the abused phrase "struggle for existence." One aspect of the abuse of it is in applying it everywhere and at all times but without any analytical definition of it. It is constantly used with its most general meaning but rarely so applied to any special instance. Yet a little reflection brings to light the glaring inadequacy of such usage. Does any one suppose that the struggle of a tree for existence is the same kind of struggle as that of a fish or a bird or a man? Is anything more obvious than that what a sea anemone does in struggling for existence is quite different from what a lion does? All manner of sophistical argument can, I am aware, be produced to justify common practice in this matter. But the facts of the situation are so obvious that for the unsophisticated these arguments do not need reviewing or answering. Manifestly the principle according to which the idea of struggle in living nature must be applied if it is to correspond to the facts and to be really useful, must be expressed about as follows: *The general phrase, struggle for existence, is meaningless for any particular plant or animal except as the struggle is for the existence of that plant or animal, according to its particular kind.*

A tree struggles for a tree's existence not for a fish's or a bird's or a man's existence; and furthermore in each case for some particular kind of tree or fish or man. An oak's struggle is different from a pine's struggle; a Fijian's struggle is different from a Parisian's, and so on through the whole gamut of life, past, present and future.

Let us bring this principle home with all its inherent force. To this end we fix attention upon that portion of the animal realm to which we ourselves belong; namely the portion equipped with highly developed muscular and nervous systems and body members for making these systems effective. Nothing is more obvious even to commonsense zoology than that the part of animal creation thus equipped falls naturally into two main divisions. There are brute animals and there are

human animals. And what differences between brutes and humans are the most striking? There are at least two which stand out so conspicuously that even a child notices them. These are first, the upright posture of the human being, by which his hands are freed from the locomotor function and made available for all sorts of activities in obedience to intelligence; and second, the language mode of expression of the human animal. To be sure, neither of these separates the human from the brute absolutely. If they did they would be quite out of harmony with the principles which prevail everywhere in natural history and so would be far less significant. Many brute animals do assume the upright posture to some degree and use their fore limbs for other purposes than moving about; and many of them surely express themselves to some extent in ways which can be properly designated as language. But the fullness of development of each of these attributes in the human as contrasted with its development in any of the brutes is such that no one ever fails to distinguish the lowest living human from the highest living brute. When we come to scrutinize closely these two differences, the free hands and language—we find the bipedal form and habit of the human as contrasted with the quadrupedal form and habit of the brute and likewise the linguistic power of the human as contrasted with the brute are both inseparably connected with the fact that the activities of brutes are predominantly hereditary; that is, are performed according to plans and methods passed along from parents to offspring in the same way that plans of physical organs and parts are passed along. On the other hand, with humans we find the activities not predominantly hereditary. That is to say, they are not inborn but have to be acquired, learned afresh by each individual. We express this difference by calling the activities of brutes mainly instinctive and those of humans mainly rational and intelligent. Brute animal activity is largely instinct while human animal activity is largely on the basis of intelligence and reason.

When civilized man is reached in the evolutional scale the eons old struggle for existence takes the form of the struggle of mankind for and on the basis of ideas and ideals. These ideas and ideals are natural by the same token that sensations, reflex actions and instincts are natural—that token being that all alike belong in deepest essence to the very nature of man.

About the most convincing sign that an attribute of any living being is natural is its adaptability. An attribute's adaptiveness is that by virtue of which it contributes to the fitness of the being to live in the surroundings in which its life is set.

The fact of natural origin—origin by birth and growth—and of natural adaptiveness imply that adaptation is never absolutely perfect, hence forever needs improvement, is forever open to progress. It is demonstrated by observations on the activities of brute animals and

of primitive men as they live in nature that the imperfection of adaptiveness to conditions of life under purely sensory and reflexive activity is very serious. In fact it is so serious that great injury, even great destruction comes to individual and race because of it. Indeed I believe it demonstrable that had not nature found a way of correcting the injurious activities to which purely instinctive behavior is ever liable, progress in animal evolution would have ended in such classes as insects and reptiles. But to find such correctives is a part of the very essence of organic origin and growth.

The great correctives found by nature are what we call reason and intelligence, essential elements in which are *Ideas* and *Ideals*. According to common conception ideas have their seat in the human brain, while ideals are seated first and foremost in the human heart.

This sketch of the part Science is playing and still more must play in the herculean task of producing a system of natural ethics, is now finished. But before leaving it I will try to compact into the limits of a last minute, the substance of what has been said.

Brute animal life became transformed into human animal life through the countless millenniums of struggle of all life to fit itself ever more completely to the conditions which make any life at all possible.

Victory, under the name humanity, finally crowned the struggle when and because of, the slow and painful acquisition by the coming victor of the power to wage the struggle on the basis of ideas and ideals instead of on the ancient basis of the purely hereditary, that is instinctive activity of his brute ancestors.

This new and higher form of the struggle as it occurs within and among the members of the human species gives what in broadest generality we name the Moral Law. And so it is that Moral Law is Natural Law, Natural Law in its application to man being the totality of the impulsions, the efforts, and the acts, by which mankind strives to attain its own highest good by making itself ever better fitted for living, whether in this or in any other world that may be its abode.